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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/553,994	12/04/2006	Takamaro Kikkawa	279784US2PCT	6573
22850 7590 10/06/2009 OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER LE, HOANGANH T				
ART UNIT 2821		PAPER NUMBER		
NOTIFICATION DATE 10/06/2009		DELIVERY MODE ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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### Office Action Summary

**Application No.**

10/553,994

**Applicant(s)**

KIKKAWA ET AL.

**Examiner**

HoangAnh T. Le

**Art Unit**

2821

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 4, 5, 8, 9, 11, 13 and 15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 4, 5, 8, 9, 11, 13 and 15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/08)  
Paper No(s)/Mail Date 1/19/06
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Specification***

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.
3. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: in claims 8 and 9, the limitation "the metal wires have a length less than one eighth of the wavelength of an electromagnetic wave" finds no support in the claim.

### ***Drawings***

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, "the receiving antennas placed on a plurality of semiconductor substrates" of claims 1,8,9,11, and 13; "the transmitting antenna is connected to internal metal wires with via-holes filled with metal" of claims 1,4, and 5; "the first interlayer insulating layer has a plurality of micro-pores that extend therethrough in the thickness direction thereof" of claim 4, "metal

wires ...connected to each other with via-holes" of claim 8; and "a transmitting/receiving antenna placed on the semiconductor substrate is placed on the same side as that on which the transmitting antenna is placed" of claim 13 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1,4,5,8,9,11,13, and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1,8,9, and 11 recite "a receiving antenna placed on the semiconductor substrate or receiving antennas placed on a plurality of semiconductor substrates". The use of "or" renders the claims alternative.

Claims 1,8,9, and 11 recite "receiving antennas placed on a plurality of semiconductor substrates". From the claims, it is not clear if each receiving antenna placed on each semiconductor substrate or the receiving antennas placed on the semiconductor substrate stack?

In claim 1, is "a semiconductor substrate" in lines 15-16 the same with "a semiconductor substrate" in lines 3-4?

In claim 1, line 16, "the multilayer wiring metal layer" has no antecedent basis.

In claim 1, line 27, "the antenna" lacks a proper antecedent basis because there are transmitting antenna and receiving antenna recited.

In claims 4 and 5, line 4, "the multilayer wiring metal layer" has no antecedent basis.

In claims 4 and 5, what is meant by " the thickness of the semiconductor substrate is greater than or equal to the far-field boundary of the electromagnetic field of an electromagnetic wave emitted from the antenna."? How thick? No description is given on the specific structure of experiment example for forming the photonic band-gap in the antenna transmission electromagnetic wave frequency.

Claim 8 recites "a plurality of metal wiring layers are.....divided so as to have a length less than one eighth of the wavelength of an electromagnetic wave propagated in a semiconductor". From the claim, it is not clear if the metal wiring layer has a length less than one eighth of the wavelength of an electromagnetic wave propagated in a semiconductor or the metal wiring has a length less than one eighth of the wavelength of an electromagnetic wave propagated in a semiconductor.

In claim 8, is "a semiconductor substrate" in lines 3-4 the same with "a semiconductor substrate" in line 12?

In claim 9, line 12, "the antenna" lacks a proper antecedent basis because there are transmitting antenna and receiving antenna recited.

In claim 11, "what is meant by "a first and second interlayer insulating layers"? There is no cooperation between the first and second interlayer insulating layers with the antennas.

In claim 15, line 2, "the maximum time" has no antecedent basis.

### ***Claim Objections***

7. Claims 4,5,8 and 9 are objected to because of the following informalities:

In the paragraph of the Best mode for carrying out the invention, it is explained that the third embodiment corresponds to claims 4 and 5. However, in the third embodiment, although it is described that the Si substrate should have a film thickness equal to or above the Far-Field boundary, there is disclosed no specific structure or experiment example for forming a photonic band-gap in the antenna transmission

electromagnetic wave frequency. Moreover, in the other embodiments, no description is given on the specific structure of experiment example for forming the photonic band-gap in the antenna transmission electromagnetic wave frequency.

In the paragraph of the Best mode for carrying out the invention, it is explained that the fourth embodiment corresponds to claims 8 and 9. However, in the fourth embodiment, it is described that when there is provided a metal wiring arranged vertical to the electromagnetic wave radiation direction of the antenna, the metal wiring has a length equal to or shorter than  $1/8$  of wavelength of the electromagnetic wave propagating in the Si substrate. However, no explanation is given on a specific structure or experiment example in which a plurality of semiconductor substrates are layered/integrated and a metal grounding layer is formed on the rear surface of the outermost semiconductor substrate farthest from the aforementioned semiconductor substrate and arranged to face outside, or on a specific structure or experiment example in which a grounding contact is arranged from the substrate surface without forming the rear surface grounding metal layer on a semiconductor substrate and on the semiconductor substrate other than the outermost semiconductor substrate farthest from the aforementioned semiconductor substrate. Furthermore, in the other embodiments, no explanation is given on a specific structure or experiment example in which a metal grounding layer is formed on the rear surface of the outermost semiconductor substrate farthest from the aforementioned semiconductor substrate and arranged to face outside, or on a specific structure or experiment example in which a grounding contact is arranged from the substrate surface without forming the rear

surface grounding metal layer on a semiconductor substrate and on the semiconductor substrate other than the outermost semiconductor substrate farthest from the aforementioned semiconductor substrate.

Accordingly, the claims 4,5,8 and 9 have not been further treated on the merits.

***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claim 13 is rejected under 35 U.S.C. 102(e) as being anticipated by Brown et al (the US Patent no. 6,765,535).

Regarding claim 13, the Brown et al reference teaches in figures 2 and 3 a semiconductor device characterized in that an electromagnetic wave transmission signal is transmitted from a transmitting antenna 208 placed on a semiconductor substrate 300 to a receiving antenna 204 placed on the semiconductor substrate 300 or receiving antennas placed on a plurality of semiconductor substrates such that wireless interconnection is accomplished, the semiconductor substrates are arranged at equal intervals so as to achieve multilayer integration (figure 3), and a transmitting/receiving



antenna 204 placed on the semiconductor substrate 300 is placed on the same side as that on which the transmitting antenna 208 is placed (figure 2).

The limitation "serves as a relay for a synchronous clock signal radiated from the transmitting antenna" is merely functional language which fails to patentably distinguish the claim.

***Allowable Subject Matter***

10. Claims 1 and 11 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

11. Claim 15 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HoangAnh T. Le whose telephone number is (571) 272-1823. The examiner can normally be reached on 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas Owens can be reached on (571) 272-1662. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HoangAnh T Le/  
Primary Examiner, Art Unit 2821